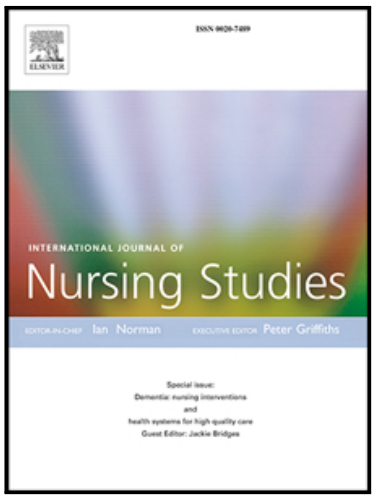

The role of community-based nursing interventions in improving outcomes for individuals with cardiovascular disease: A systematic review

Emeline Han , Rina Yu Chin Quek , See Mieng Tan , Shweta R Singh , Farah Shiraz , Montserrat Gea-Sánchez , Helena Legido-Quigley

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Title

The role of community-based nursing interventions in improving outcomes for individuals with cardiovascular disease: A systematic review.

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Abstract

Objective: To examine the role of community-based nursing interventions in improving outcomes for community-dwelling individuals with cardiovascular disease.

Design: A systematic review and narrative synthesis.

Data sources: Seven electronic databases (MEDLINE, CINAHL, Global Health, LILACS, Africa-Wide Information, IMEMR and WPRIM) were searched from inception to 16 March 2018 without language restrictions.

Review methods: We included studies evaluating the outcomes of interventions led by, or primarily delivered by, nurses for individuals with cardiovascular disease in community settings. Study selection, data extraction and risk of bias assessments were performed by at least two independent reviewers.

Results: Twenty-eight studies met the inclusion criteria and were included in this review. Community-based nursing interventions improved outcomes in four key areas: (1) self-care, (2) health, (3) healthcare utilisation, and (4) quality of care. Significant improvements were reported in patients' knowledge and ability to self-manage, severity of disease, functional status, quality of life, risk of death, hospital readmission days, emergency department visits, healthcare costs and satisfaction with care. Facilitators to intervention effectiveness included the use of an individualised approach, multidisciplinary approach, specially trained nurses, family involvement and the home setting. Conversely, barriers to intervention success included limitations in nurses' time and skills, ineffective interdisciplinary collaboration and insufficient intervention intensity.

Conclusions: The overall evidence is positive regarding the role of community-based nursing interventions in improving outcomes for individuals with cardiovascular disease. However, this review highlights the need for more robust research establishing definitive relationships between different types of interventions and outcomes as well as evaluating the cost-effectiveness of these interventions to aid the development of sustainable policy solutions.

Keywords

Cardiovascular diseases; community health nursing; home health nursing; systematic review

What is already known about the topic?

- Nursing interventions and community-based interventions have beneficial impacts on individuals with different types of cardiovascular diseases.

What this paper adds

- The evidence is largely positive with regards to the role of community-based nursing interventions in improving self-care outcomes, health outcomes, healthcare utilisation outcomes and quality of care outcomes.
- Facilitators to intervention effectiveness included the use of an individualised approach, multidisciplinary approach, specially trained nurses, family involvement and the home setting.
- Barriers to intervention success included limitations in nurses' time and skills, ineffective interdisciplinary collaboration and insufficient intervention intensity.

1. Introduction

Cardiovascular disease (CVD) is currently the world's number one cause of mortality, accounting for 31% of global deaths with over 75% of these deaths occurring in low- and middle-income countries (LMICs) (World Health Organization, 2017a). As part of the 2030 Agenda for Sustainable Development, all members States of the United Nations (UN) have committed to the goal of a one-third reduction in premature mortality from non-communicable diseases (NCDs) by 2030 through prevention and treatment (UN, 2015). Given that CVD causes the largest proportion of NCD deaths, the World Heart Federation (WHF) has also set the goal of a 25% reduction in premature mortality from CVD by 2025 (WHF, 2012).

To achieve these targets in the face of limited healthcare resources, leaders of the WHF have highlighted the need for new models of care for NCDs that are community-based and can be primarily delivered by health professionals such as nurses (Yusuf et al., 2015). It has been indicated that nurses have a particularly important role to play in the prevention and treatment of NCDs, as they have an extensive reach within local communities and close relationships with patients in which there is trust, continuity of contact, better understanding of patients' needs and thereby, greater ability to provide the appropriate care (Alleyne et al., 2011). A systematic review and meta-analysis by Massimi et al. (2017) showed that community-based nurse-led self-management support interventions for patients with NCD successfully reduced blood pressure and HbA1c levels, and were especially beneficial for patients with CVD or diabetes.

Other systematic reviews have evaluated the effects of nursing interventions or community-based interventions on patients with CVD. Allen and Dennison (2010) found that nursing interventions for patients with coronary artery disease and heart failure led to improvements in blood pressure, lipids, physical activity, diet, smoking, weight loss, healthcare utilization, mortality, quality of life, and psychosocial outcomes. Most recently, Lawlor et al. (2018) also reported that community-based behaviour change interventions for patients with CVD had a positive impact on physical activity, peak oxygen uptake, blood pressure, blood cholesterol level and mental health.

However, these existing reviews have either considered the contribution of nursing or community-based care but not both together, or focused on specific CVDs and specific types of interventions. The types of interventions that nurses deliver in community settings for chronic conditions include patient education, self-care support, lifestyle and behaviour change, as well as care coordination (Frich, 2003). To our knowledge, there is no systematic review elucidating the unique value of community-based nursing including different types of interventions for various CVDs and their risk factors.

To address this knowledge gap, we conducted a systematic review with the following aims:

i) To examine the role of community-based nursing interventions in improving outcomes for community-dwelling individuals with CVD and/or CVD risk factors.
ii) To explore potential barriers and facilitators to the effectiveness of these interventions.
iii) To make recommendations for future research and policy.

Due to differences in the goals and outcomes of interventions targeting individuals with established CVD versus those exhibiting risk factors of CVD, the systematic review will be reported in two parts to explore both areas thoroughly. This paper will review interventions focusing on treating and managing CVD to minimise the negative impact of the disease on patients' lives, while interventions focusing on reducing the risk of developing CVD will be reviewed in a separate paper.

2. Methods

We developed this review according to PRISMA guidelines (Moher et al., 2009) and published a protocol on PROSPERO, the international prospective register of systematic reviews (PROSPERO 2018: CRD42018090631). Drawing on the definitions of 'cardiovascular disease' by the National Health Service (NHS, 2016) and 'community-based nursing' by Stanhope and Lancaster (2014), the key terms used in this review are defined in Supplementary Table S1.

2.1. Search Strategy

A search strategy was developed and refined with contributions from an information specialist. Keywords (MeSH terms) and text words were identified for each conceptual area relating to CVDs, CVD risk factors and community-based nursing to generate the search string for MEDLINE. The full MEDLINE search string is presented in Supplementary Table S2. In addition, modified searches were performed on CINAHL, Global Health, LILACS, Africa-Wide Information, IMEMR and WPRIM. All databases were searched independently by two reviewers to ensure accurate retrieval.

2.2. Inclusion and Exclusion Criteria

The inclusion criteria for this review were:

i) Primary research studies reporting on the outcomes of interventions led by, or primarily delivered by, nurses for individuals with CVD in community settings.
ii) All study designs, including controlled trials, cohort studies, cross-sectional studies and qualitative studies.
iii) Studies published in any language from inception to 16 March 2018.

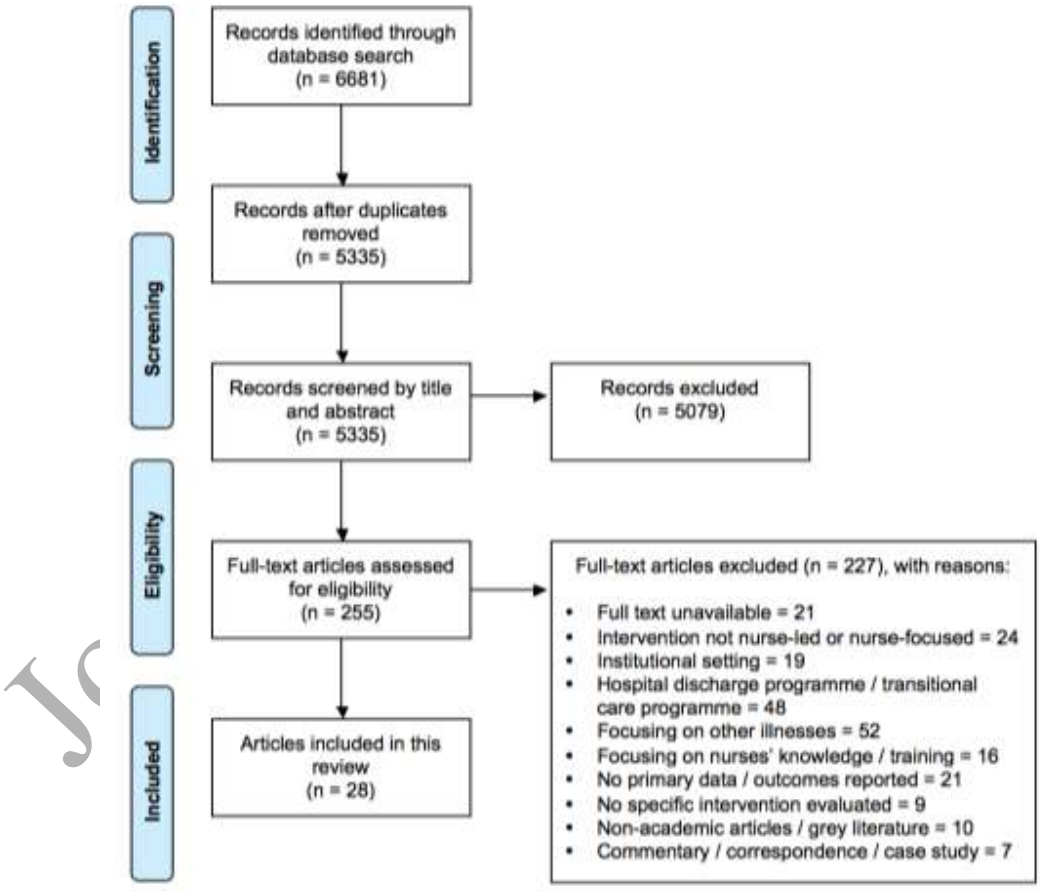
We excluded the following studies:

i) Studies that involved nurses but focused on other aspects such as the role of telemedicine or multidisciplinary care.
ii) Studies evaluating interventions based in hospitals, nursing homes and other healthcare institutions, including hospital discharge and transitional care programmes.
iii) Non-empirical studies, secondary research studies, non-academic articles, grey literature and other literature that did not report on outcomes.

2.3. Study Selection

Five reviewers (EH, RQ, SM, MGS, HLQ) were involved in the screening process. Two reviewers independently screened the search results by title and abstract for potential eligibility. Full texts of the potentially eligible articles were then further screened by two reviewers for inclusion. Any conflicts were resolved by a third reviewer. Articles in languages other than English (e.g. Mandarin, Spanish and Korean) were screened by reviewers who were fluent in those languages or with the help of a translator. Details of the studies screened and included at each stage are presented in an adapted PRISMA flowchart (Figure 1). Document Delivery Service (DDS) was used to request for full-text articles that were not available online or in the library system, but there remained some that could not be obtained.

Figure 1: Adapted PRISMA flowchart



2.4. Data Extraction and Synthesis

Three reviewers (EH, RQ, SM) used a standardised form to extract information from the included articles in the following categories: (1) study characteristics including study design and setting, (2) types of diseases, (3) types of interventions, (4) outcomes reported, and (5) barriers and facilitators of the interventions. The reviewers discussed and resolved any discrepancies on the data extracted. A narrative synthesis of the results was performed.

2.5. Risk of Bias Assessment

The risk of bias of each study was assessed independently by two of three reviewers (EH, RQ, SM) and any disagreements were resolved by discussion. The Cochrane Risk of Bias Tool was used to assess randomised controlled trials (RCTs) for five main domains: selection, performance, detection, attrition, and reporting bias. Studies with “low” or “high” risk in three or more domains and “moderate” risk in any remaining domain(s) were classified as having overall low or high risk of bias respectively. Studies with “moderate” risk in three or more domains and “low” or “unclear” risk in any remaining domain(s) were classified as having overall moderate risk of bias. Studies with “moderate” risk in three or more domains and “high” risk in any remaining domain(s) were classified as having overall high risk of bias.

For non-randomised controlled trials, we used the Risk Of Bias In Non-randomised Studies – of Interventions (ROBINS-I) assessment tool developed by the Cochrane Methods Bias Group and the Cochrane Non-Randomized Studies for Interventions Methods Group (Sterne et al., 2016). Seven main domains of bias were assessed: confounding, selection, classification, deviation from intended intervention, attrition, measurement of outcomes and reporting bias. Low, medium or high overall risk of bias was allocated in a similar manner to the RCTs.

To assess the quality of qualitative studies, we used an adapted checklist of ten core criteria that was previously used in a series of mixed-methods systematic reviews (Harden et al., 2001; Rees et al., 2001).

A score of zero to three was classified as an overall high risk of bias, four to seven as overall moderate risk of bias, and eight to ten as overall low risk of bias.

3. Results

Database searches identified a total of 6681 records. After removing duplicates, 5335 records were screened by title and abstract. Of the 255 full-text articles assessed for eligibility, twenty-eight articles met the final inclusion criteria.

3.1. Study Characteristics

Of the twenty-eight studies included in this review, twenty-five were quantitative. Of these, twelve were RCTs, five were non-randomised controlled studies, seven were single group pre-post intervention studies and one was a cross-sectional study. Of the remaining three studies, two were qualitative and one was mixed methods (although evaluation of the intervention was purely qualitative). As shown in Figure 2, studies were conducted in Europe (n=10), North America (n=9), Asia (n=4), South America (n=3), Australia (n=1) and the Middle East (n=1). Twenty-three studies were conducted in high-income countries, five studies in middle-income countries and none in low-income countries.

Figure 2: Geographical distribution of included studies

Studies included participants with heart failure (n=15), stroke (n=5), coronary heart/artery disease (n=3), myocardial infarction (n=2) and a mix of multiple diseases (n=3). Interventions were led/delivered by specialist cardiac nurses (n=11), generalist community nurses or home health nurses (n=8), nurse case managers (n=2), research nurses (n=2) and nurse-counsellors (n=1). Four studies did not specify the type of nurses that led/delivered the intervention. In total, twenty-three interventions took place exclusively in patients' homes, three interventions took place in a combination of settings including patients' homes, community clinics, community centres and faith-based organisations, and two interventions took place in unspecified community venues. Types of interventions included patient education, adherence counselling, self-care support, goal-setting, problem-solving, symptom monitoring, rehabilitation and care management. Descriptions of the interventions in each study can be found in Tables 1-5.

3.2. Intervention Outcomes

Reported outcomes were categorised as self-care outcomes, health outcomes, healthcare utilisation outcomes and quality of care outcomes. Definitions and examples of these categories are provided in Supplementary Table S3.

We found eight articles that focused on self-care outcomes, six articles that focused on health outcomes, five articles that focused on healthcare utilisation outcomes and three articles that focused on quality of care outcomes. Six articles evaluated multiple outcomes: two articles evaluated health and healthcare utilisation outcomes, two articles evaluated health and quality of care outcomes, one article evaluated health and self-care outcomes, and one article evaluated healthcare utilisation and self-care outcomes. In reporting the outcomes below, we have provided measures of effect such as mean differences, odds ratios (ORs), risk ratios (RRs), hazard ratios (HRs) and incidence density ratios (IDRs) where these have been explicitly stated by the studies, with the associated p-values and 95% confidence intervals (CIs).

3.2.1.Self-care Outcomes

Of the eight studies focusing on the self-care outcomes of community-based nursing interventions for patients with CVD, six studies reported statistically significant improvements in patients' overall self-care (Table 1). Three articles reported significant improvements in patients' knowledge and three articles reported significant improvements in treatment adherence. Two studies had a high risk of bias, five studies had a moderate risk of bias and one study had a low risk of bias.

Five of these studies targeted patients with heart failure. An RCT in Brazil investigated the effects of an educational nursing intervention for patients with heart failure. The intervention group displayed significant improvements in self-care (mean difference 22.36%±6.46, 95% CI -10.82 – -6.30, p<0.001), knowledge of heart failure (mean difference 71.15%±13.82, 95% CI 11.62 – 20.77, p=0.001) and adherence to the treatment (73.52%±10.26 – 57.44%±11.96, 95% CI -19.69 – -10.04, p=0.001) (Mussi et al., 2013). An RCT in Colombia also reported that an education nursing intervention led to improvements in self-care behaviours of patients with heart failure, with 66% of the intervention group improving by at least 20% in their self-care scores (adjusted OR 4.2 [95% CI 1.4 – 12.3], p=0.006) as compared to 27% of the control group (Rodríguez-Gázquez et al., 2012). In the United States (US), a longitudinal, repeated-measures RCT was used to compare supportive-educative, mutual goal-setting and placebo nursing interventions

for patients with heart failure. A significant increase in self-efficacy in managing heart failure was found in the supportive-educative group at twelve months (39.85±7.54 – 35.86±8.88, p=0.038), while no significant differences in self-efficacy were found in the placebo and mutual goal-setting groups (Kline, 2007).

In Brazil, a pre-post intervention study reported that knowledge of the disease and self-care significantly improved (70.8±16.9% – 64±18.2%, p=0.020) among patients with heart failure after an educational home visit by specialist nurses (Bertuzzi et al., 2012). In England, another pre-post intervention study evaluating an educational and self-care support intervention by heart failure nurse specialists also reported overall significant improvement in self-care (31.24±9.19 – 26.07±8.48, p=0.011), with statistically significant improvements in five behaviours: uptake of flu and pneumonia vaccination (1.49±0.82 – 1.00±1.21, p=0.009), regular weighing (1.42±0.83 – 0.18±1.31, p=0.001), recognising changes in sleep patterns (1.33±0.65 – 0.88±1.08, p=0.014), recognising signs of fluid retention (1.59±0.56 – 0.82±1.03, p=0.001) and going out as much as possible (1.38±0.70 – 0.91±1.14, p=0.019) (MacInnes and Walton, 2016).

Two of the studies targeted patients with stroke. A non-randomised controlled study in Hong Kong evaluated the effectiveness of a secondary stroke prevention programme led by experienced community registered nurses for patients with minor stroke (Sit et al., 2007). Participants demonstrated significant improvements in knowledge of stroke symptoms (effect size 0.28, p<0.001) and care-seeking response (percentage change 75.3%, p<0.001), self-monitoring of blood pressure (percentage change 27.6%, p<0.001), medication adherence (effect size 0.27, p<0.001) and dietary habits (reduction in salt intake, effect size 0.22, p=0.004) but not in exercise participation. In Scotland, a mixed-methods study was conducted to develop and evaluate an individualised self-management support intervention led by community nurses for patients in their first year post-stroke (Kidd et al., 2015). Evaluation by qualitative interviews and focus groups found that the intervention was feasible and acceptable to patients and nurses, and patients also reported that the intervention increased their knowledge and confidence in self-management.

One of the studies targeted patients with myocardial infarction. An RCT in Iran demonstrated statistically significant improvements in medication adherence (mean difference 4.08±0.367, $p<0.05$) and dietary adherence (mean difference 17.45±56.12, $p=0.001$) among patients with myocardial infarction after a nurse-led telephone follow-up intervention, with significant differences between the intervention and control group (Najafi, 2016).

Table 1: Characteristics, findings and risk of bias of studies on self-care outcomes

Author and Year	Study Design	Population and Context	Intervention/Control	Outcomes and Findings	Risk of Bias Assessment
Bertuzzi et al., 2012	Single group pre-post intervention study	41 patients with heart failure in a metropolitan area of Brazil	Two home visits were conducted by specialist nurses. The content of the intervention included education on early recognition of symptoms, effects of medications, drug dosage and schedule, restrictions on sodium and water intake, abstinence from tobacco and alcohol, as well as preventive measures such as immunisation and physical activity.	Patients' mean percentage of knowledge about heart failure and self-care increased from 64±18.2% to 70.8±16.9% after the intervention, showing a significant improvement in knowledge (p=0.020).	High (no information on confounders, attrition and limitations)
Kidd et al., 2015	Mixed methods (but evaluation was purely qualitative)	26 patients with stroke in Scotland	The intervention was a stroke self-management support intervention tailored to individual patients' needs, goals and abilities to self-manage. The self-management action plan incorporated an assessment of patients' readiness to self-manage, goal setting and motivational interviewing. The intervention was delivered via three home visits by stroke nurses over a 4-week period.	Most participants reported that they had received appropriate and timely information and that the intervention increased their knowledge of stroke and their confidence to self-manage. Only one participant perceived no change in his knowledge or confidence.	Low
Kline, 2007	Randomised controlled trial	56 patients with heart failure receiving home healthcare services from 2 nursing agencies in the United States	All participants received usual care, followed by 1 of 3 nursing approaches: placebo, supportive-educative or mutual goal-setting. In the placebo intervention, patients received general health promotion information. In the supportive-educative intervention, nurses educated patients on self-care while providing additional support. In the mutual goal-setting intervention, nurses collaborated with patients to identify individual goals and develop strategies to achieve them. All 3 interventions were conducted weekly for 8 weeks.	The supportive-educative group showed a significant increase in self-efficacy after the intervention (39.85±7.54 – 35.86±8.88, p=0.038). Participants in this group had higher confidence in their ability to manage heart failure at the 12-month period than at baseline. No significant differences in self-efficacy were found in the placebo or mutual goal-setting group.	Moderate (no information on randomisation method, no blinding and high attrition rate)
MacInnes and Walton, 2016	Single group pre-post intervention study	36 patients with heart failure in England	The intervention included information, education, practical advice and support by heart failure nurse specialists aimed at developing self-care strategies among patients.	Participants displayed significant improvement in overall self-care (31.24±9.19 – 26.07±8.48, p=0.011), with statistically significant improvements in five behaviours: uptake of flu and pneumonia vaccination (1.49±0.82 – 1.00±1.21, p=0.009), regular weighing (1.42±0.83 – 0.18±1.31, p=0.001), recognising changes in sleep patterns (1.33±0.65 – 0.88±1.08, p=0.014), recognising signs of fluid retention (1.59±0.56 – 0.82±1.03, p=0.001) and going out as much as possible (1.38±0.70 – 0.91±1.14, p=0.019).	Moderate (no adjustment for confounders and high attrition rate)
Mussi et	Randomised	151 patients	The intervention comprised four home visits and four	The intervention group showed	Moderate

al., 2013	controlled trial	with heart failure in a metropolitan area of Brazil	phone calls over a 6-month period by nurses specialising in heart failure care. During each visit, patient and caregiver/relatives received education on the disease, medication use and effects, non-pharmacological care actions such as weight control, physical exercise and vaccinations, as well as clarifications of patients and relatives' doubts. The intervention sought to help patients put self-care strategies into practice. The control group received usual care without home visits and phone calls.	significant improvement in self-care (mean difference 22.36%±6.46, 95% CI -10.82 – -6.30, p<0.001), knowledge of heart failure (mean difference 71.15%±13.82, 95% CI 11.62 – 20.77, p=0.001) and treatment adherence (73.52%±10.26 – 57.44%±11.96, 95% CI -19.69 – -10.04, p=0.001).	(high attrition rate and no discussion of limitations)
Najafi, 2016	Randomised controlled trial	100 patients with myocardial infarction in Iran	Both the intervention and control groups received routine healthcare services such as check-up or screenings by physicians. Additionally, the intervention group received 3 months of nurse-led telephone follow-up providing education on the symptoms of myocardial infarction, counselling on diet and medications, as well as encouraging behaviour change and treatment adherence.	The intervention group showed a significant improvement in dietary adherence (mean difference 17.45±56.12, p=0.001) and medication adherence (mean difference 4.08±0.367, p<0.05). The control group showed no significant improvements.	Moderate (convenience sampling and no blinding)
Rodríguez-Gázquez et al., 2012	Randomised controlled trial	55 patients with heart failure in Colombia	The intervention was a 9-month educational nursing programme consisting of group meetings, telenursing sessions and home visits for heart failure patients and their families. The programme focused on five areas: knowledge of the disease, treatment adherence, requesting for help during the disease, adapting to life with the disease and the effects of medication, as well as patient empowerment and motivation. The control group received usual care.	Self-care scores improved by at least 20% for 66% of intervention participants, compared to 26.6% of control participants (adjusted OR 4.2 [95% CI 1.4 – 12.3], p=0.006).	Moderate (no blinding and no discussion of limitations)
Sit et al., 2007	Non-randomised controlled study	190 patients with stroke and of a relatively high level of education in Hong Kong	The intervention group received a community-based stroke prevention programme delivered by three experienced community registered nurses. The programme consisted of eight weekly sessions using teaching, games, experience sharing and experimental learning methods to promote group interaction and individual reflection. Participants developed individual goals and action plans and were required to track and report on goal achievements. The control group received conventional care and health promotion pamphlets on stroke and stroke prevention.	Intervention participants demonstrated significant improvements in knowledge of stroke symptoms (effect size 0.28, p<0.001), treatment seeking response (percentage change 75.3%, p<0.001), medication adherence (effect size 0.27, p<0.001), self-monitoring of blood pressure (percentage change 27.6%, p<0.001) and change in dietary habits (reduction in sodium intake, effect size 0.22, p=0.004). No significant improvement in exercise participation was found in the intervention group but a significant decrease was found in the control group.	High (high selection bias, moderate classification bias, high attrition rate and no adjustment for confounders)

3.2.2.Health Outcomes

Of the six studies focusing on health outcomes of community-based nursing interventions for patients with CVD, two studies reported statistically significant improvements in patients' overall health or quality of life, three studies reported significant improvements in patients' mental health and one study reported significantly lower risk of death (Table 2). One study had a high risk of bias, four studies had a moderate risk of bias, and two studies had a low risk of bias.

Two studies targeted patients with heart failure, both of which reported significant improvements in mental health. A Taiwanese RCT evaluated the effectiveness of an individualised educational supportive programme delivered by a senior nurse with experience in cardiovascular nursing for patients with heart failure (Chang et al., 2016). The intervention successfully improved levels of sleep quality (7.63±3.37 – 9.60±3.44, p<0.001), daytime sleepiness (5.37±3.53 – 7.70±5.52, p<0.001), anxiety (4.09±3.20 – 3.86±2.92, p=0.488) and depression (7.19±4.99 – 7.12±2.94, p=0.493). A repeated-measures RCT in the US compared three nursing interventions conducted weekly for patients with heart failure: mutual goal-setting, supportive-educative, and placebo. At six months, the mutual goal-setting intervention group showed significantly higher scores than the other groups on mental health (85.41±15.80 vs. 66.22±28.02 vs. 62.61±19.03, p=0.003) and overall quality of life (25.02±3.63 vs. 22.95±4.75 vs. 20.79±4.78, p=0.010), as well as three quality of life domains: health/functioning, psychosocial/spiritual and socioeconomic (Scott et al., 2004).

Two studies targeted patients with stroke. The first study was a pre-post intervention study in Singapore examining a home rehabilitation programme conducted by trained nurses for patients with stroke (Ray and Nair, 1981). At twelve weeks, 84% of patients showed marked improvements in gaining independence in mobility regardless of age. An average of 6.4±2.3 nurse visits and 91.6±47.1 days was required for patients to reach independence. The second study was an RCT in England which found that specialist outreach nurse visits providing information, advice and support for patients with stroke and their caregivers over twelve months led to no significant differences in patients' perceived health and social

activities or caregiver stress (Forster and Young, 1996). Only a subgroup of mildly disabled patients showed a significant difference in social outcomes (adjusted median difference 0.59 [95% CI 0.14 – 1.05], p=0.01) compared to the control group.

One study targeted patients with coronary artery disease. In Scotland, an RCT examined the impact of a nurse-led shared care intervention comprising patient education and motivational interviewing for patients awaiting coronary artery bypass grafting (McHugh et al., 2001). The intervention was successful at significantly improving general health status across all domains, with mean differences ranging from 8.1 (p=0.005) to 36.1 (p<0.000). The intervention group showed significantly greater reductions in smoking (25% vs. 2%, p=0.001), obesity (16.3% vs. 8.1%, p=0.01), anxiety (41% reduction vs. 50% increase, p=0.000) and depression (64% reduction vs. 85% increase, p=0.000). Intervention participants also achieved greater improvements in target systolic blood pressure (19.8% vs. -10.7%, p=0.001), target diastolic blood pressure (21.5% vs. 10.2%, p=0.000) and time spent being physically active (33% vs. -16%, p=0.000). However, there was no significant difference between groups in the percentage of patients exceeding target cholesterol concentrations (10.54% vs. 5.4%, p=0.306).

The final study addressed a variety of diseases. An RCT in the US found that community-based nurse care management reduced all-cause mortality in elderly with heart failure, coronary heart disease, asthma, diabetes, hypertension and/or hyperlipidaemia (Coburn et al., 2012). This model of care coordination and disease management resulted in a 25% lower relative risk of death (adjusted HR 0.73 [95% CI 0.55 – 0.98], p=0.033) in the intervention group during a follow-up of 4.2 years.

Table 2: Characteristics, findings and risk of bias of studies on health outcomes

Author and Year	Study Design	Population and Context	Intervention/Control	Outcomes and Findings	Risk of Bias Assessment
Chang et al., 2016	Randomised controlled trial	84 patients with heart failure in Taiwan	The intervention group received a 12-week tailored educational supportive care programme conducted by a senior nurse with clinical experience in cardiovascular nursing. The programme included individualised education on sleep hygiene, self-care and emotional support through a monthly nursing visit as well as telephone follow-up counselling every 2 weeks. The control group received routine nursing care.	The intervention group showed significant improvements in levels of sleep quality (7.63±3.37 – 9.60±3.44, p<0.001), daytime sleepiness (5.37±3.53 – 7.70±5.52, p<0.001), anxiety (4.09±3.20 – 3.86±2.92, p=0.488) and depression (7.19±4.99 – 7.12±2.94, p=0.493).	Moderate (convenience sampling and no blinding)
Coburn et al., 2012	Randomised controlled trial	1736 patients in the United States with heart failure, coronary heart disease, asthma, diabetes, hypertension, and/or hyperlipidaemia	The intervention group received community-based nurse care management. The interventions included patient education, symptom monitoring, adherence counselling, weight loss maintenance, group exercise classes and service referrals facilitated by highly experienced community-based nurse care managers. Settings included patients' homes, community centres and faith-based organisations. Intervention participants received an average of 17.4 contacts per year during the study. The control group received usual care.	A 25% lower relative risk of death (adjusted HR 0.73 [95% CI 0.55 – 0.98], p=0.033) was reported for the intervention group, with 86 (9.9%) deaths compared to 111 (12.9%) deaths in the control group during a mean follow-up of 4.2 years.	Low
Forster and Young, 1996	Randomised controlled trial	240 patients with stroke in England	The intervention consisted of home visits by specialist outreach nurses over 12 months. Content of the visits included goal-setting, problem-solving and tailored information, advice and support. The nurses also maintained telephone contact with the patients and caregivers. The nurses were experienced with disabled elderly patients and in community-based problem-solving approaches. They also attended a pre-intervention training programme to improve their counselling and listening skills.	No significant differences in patients' perceived health, physical abilities, social activities or caregiver stress were found between the intervention and control groups. Only a subgroup of mildly disabled patients showed a significant difference in social outcomes (adjusted median difference 0.59 [95% CI 0.14 – 1.05], p=0.01) compared to the control group.	Low
McHugh et al., 2001	Randomised controlled trial	98 patients on the waiting list for coronary artery bypass surgery from 23 predominantly rural communities in	The intervention group received monthly health education sessions delivered alternately by a community-based specialist cardiac liaison nurse in patients' homes and by a general practitioner team nurse in a clinic. The sessions including assessment of behavioural risk factors and attainment of target values based on guidelines for hypercholesterolemia and	Intervention participants were more likely to stop smoking (25% vs. 2%, p=0.001) and reduce obesity (16.3% vs. 8.1%, p=0.01) than control participants. Intervention participants showed greater improvements in target systolic blood pressure (19.8% vs. -10.7%, p=0.001), target diastolic blood pressure (21.5% vs. 10.2%, p=0.000) and	Moderate (no information on randomisation method, no blinding and moderate attrition rate)

		Scotland	hypertension. The control group received usual care.	time spent being physically active (33% vs. -16%, p=0.000) than control participants. They also had significant improvements in general health status across all domains, with mean differences ranging from 8.1 (p=0.005) to 36.1 (p<0.000). There was a 41% reduction in definite cases of anxiety in the intervention group compared to a 50% increase in the control group (p=0.000), and a 64% reduction in definite cases of depression in the intervention group compared to a 85% increase in the control group (p=0.000). However, there was no significant difference between groups in the percentage of patients exceeding target cholesterol concentrations (10.54% vs. 5.4%, p=0.306).	
Ray and Nair, 1991	Single group pre-post intervention study	83 patients with stroke in Singapore assessed as having good or fair rehabilitation potential	The intervention was a home community rehabilitation programme comprising regular visits by staff nurses for 12 weeks. The nurses underwent systematic training by experienced physiotherapists prior to the intervention. The programme included aspects such as positioning, transferring, therapeutic techniques, with emphasis given to sitting and standing balance, simple gait training, use of simple aids and equipment to maintain mobility and balance, as well as instilling confidence in patients as they learnt the skills to be independent.	Irrespective of age, 84% of the patients showed marked improvements in all ten areas assessed: concentration, head control, return of tone, sitting balance, standing balance, mobility, power of affected lower limb, power of affected upper limb, coordination and continence. An average of 6.4±2.3 nurse visits and 91.6±47.1 days was required for patients to reach independence.	High (high selection bias and unclear outcome measurements)
Scott et al., 2004	Randomised controlled trial	88 patients with heart failure in the United States	There were 3 nursing interventions: mutual goal-setting, supportive-educative, and placebo. In the mutual goal-setting intervention, nurses collaborated with patients to identify individual goals and develop strategies to achieve them. In the supportive-educative nursing intervention, nurses educated the patients on self-care while providing additional support. In the placebo intervention, patients received general health promotion information. All 3 interventions were conducted weekly for 8 weeks.	At 6 months, the mutual goal-setting group showed significantly higher scores than the supportive-educative group and placebo group on mental health (85.41±15.80 vs. 66.22±28.02 vs. 62.61±19.03, p=0.003) and overall quality of life (25.02±3.63 vs. 22.95±4.75 vs. 20.79±4.78, p=0.010), as well as three quality of life domains: health/functioning, psychosocial/spiritual and socioeconomic. The supportive-educative group showed significant improvement in their quality of life but not mental health.	Moderate (convenience sampling, no blinding and high attrition rate)

3.2.3.Healthcare utilisation

Of the five studies that assessed the healthcare utilisation outcomes of community nursing interventions for patients with CVD, two studies reported a statistically significant decrease in hospitalisation or readmission rates, one reported a significant decrease in emergency department visits and one reported significantly lower healthcare costs (Table 3). One study had a high risk of bias, three studies had a moderate risk of bias, and one study had a low risk of bias.

Three studies targeted patients with heart failure, all of which reported reductions in hospitalisation or readmission rates. A non-randomised controlled study in the US showed that patients with congestive heart failure who were case managed by trained nurses using a clinical plan had fewer hospital visits than patients managed with traditional care practices (Huggins, 1998). None of the eighteen intervention participants were readmitted to hospital within thirty days while five out of twenty-seven comparison participants were readmitted within thirty days. A pre-post intervention study in Italy evaluated the impact of nurse-led home visits for elderly patients with heart failure (Rondinini et al., 2008). There was a significant reduction in cardiac hospitalisations (1.07±1.39 – 1.83±1.54, p=0.004), total hospitalisations (1.52±1.68 – 2.09±1.71, p=0.003), heart failure clinic visits (2.24±1.38 – 3.31±2.33, p=0.03) and New York Heart Association class (2.49±0.61 – 2.74±0.70, p=0.04). A pre-post evaluation of a nurse-led clinical pathway for elderly patients with congestive heart failure in the US also found a 19% decrease in thirty-day readmission rates (Moore, 2016).

One study targeted patients with post-myocardial infarction. A Canadian RCT reported that a community-based inner-city disease management programme for patients with post-myocardial infarction delivered by cardiac-trained home health nurses significantly reduced hospital readmission days for congestive heart failure and angina (IDR 1.59, 95% CI 1.27 – 2.00, p<0.001), all-cause readmission days (IDR 1.53, 95% CI 1.37 – 1.71, p<0.001) and emergency department encounters (IDR 2.08, 95% CI 1.56–2.77, p<0.001). The intervention group also had significantly fewer claims than the control group for emergency

services (mean 0.7 vs. 1.3, p=0.007), diagnostic or therapeutic services (mean 11.9 vs. 16.1, p=0.012) and laboratory services (mean 26.5 vs. 38.1, p=0.007) (Young et al., 2003).

The last study targeted patients with a variety of conditions. A non-randomised controlled study assessed the impact of nurse-delivered care calls on hospital admission rates among members of a German health insurer with coronary artery disease, heart failure, diabetes and chronic obstructive pulmonary disease (Hamar et al., 2010). There was a 6.2% decrease in admission rate in the intervention group compared to a 14.9% increase in the control group ($p<0.001$). Furthermore, the admission rate decreased as the number of care calls increased, demonstrating a dose-response relationship. The greatest reduction in admission rate was found in the heart failure group.

Table 3: Characteristics, findings and risk of bias of studies on healthcare utilisation outcomes

Author and Year	Study Design	Population and Context	Intervention/Control	Outcomes and Findings	Risk of Bias Assessment
Hamar et al., 2010	Non-randomised controlled study	22,987 members of a private health insurer in Germany with coronary artery disease, heart failure, diabetes or chronic obstructive pulmonary disease	The intervention group received care calls delivered by trained nurse-counsellors. The calls aimed to support appropriate treatment decisions, provide advice on self-care, as well as encourage positive health behaviours and adherence to treatment including regular physician visits and medication adherence. The nature and content of the calls were tailored to the needs of each individual. In addition to receiving the scheduled calls from nurses, participants could also initiate calls to the nurses. The control group did not receive care calls.	There was a 6.2% decrease in admission rates in the intervention group compared with a 14.9% increase in the control group (p<0.001). Furthermore, the admission rate decreased as the number of calls increased, indicating a dose-response relationship. The greatest absolute and relative reduction in admission rates was found in the heart failure population group.	Moderate (high selection bias)
Huggins, 1998	Non-randomised controlled study	45 patients with heart failure in the United States	Intervention participants were case managed for 6 weeks by trained nurses with cardiac nursing experience using a clinical plan. The control participants received usual care.	None of the 18 intervention participants were readmitted to hospital within 30 days while 5 out of 27 control participants were readmitted within 30 days.	High (no information on sampling, classification, attrition and confounding)
Moore, 2016	Single group pre-post intervention study	22 elderly patients with heart failure in the United States	The intervention was a nurse-led clinical pathway that included home visits, phone calls, tele-monitoring, patient education and self-management.	Patients' admission rates decreased from 27.8% to 9% after 4 months on the clinical pathway.	Moderate (convenience sampling and no adjustment for confounders)
Rondinini et al., 2008	Single group pre-post intervention study	44 elderly patients with heart failure in Italy	The intervention consisted of bi-annual home visits led by trained nurses. Content of the visits included provision of information and advice, monitoring of symptoms and performance of diagnostic tests under the supervision of a cardiologist. The nurses were also available via telephone contact during office hours.	There was a significant reduction in cardiac hospitalisations (1.07±1.39 – 1.83±1.54, p=0.004), total hospitalisations (1.52±1.68 – 2.09±1.71, p=0.003), heart failure clinic visits (2.24±1.38 – 3.31±2.33, p=0.03) and New York Heart Association class (2.49±0.61 – 2.74±0.70, p=0.04).	Moderate (high attrition rate and no adjustment for confounders)
Young et al., 2003	Randomised controlled trial	146 patients with myocardial infarction and of low income and education levels in an inner-city area of Canada	The intervention group participated in an 8-week disease management programme comprising a standardised pathway, referral criteria for specialty care management, communication systems and patient education. They received a minimum of 6 home visits from a cardiac-trained nurse. The control group received usual care.	The intervention group had significantly lower hospital readmission days for congestive heart failure and angina (IDR 1.59, 95% CI 1.27 – 2.00, p<0.001), all-cause readmission days (IDR 1.53, 95% CI 1.37 – 1.71, p<0.001) and emergency department encounters (IDR 2.08, 95% CI 1.56 – 2.77, p<0.001) per 1000 follow-up days. The intervention group also had	Low

				significantly fewer claims for emergency services (mean 0.7 vs. 1.3, p=0.007), diagnostic or therapeutic services (mean 11.9 vs. 16.1, p=0.012) and laboratory services (mean 26.5 vs. 38.1, p=0.007) during the first 225 days after discharge.	

3.2.4.Quality of care

Three studies assessed the quality of care provided in community-based nursing interventions for patients with CVD, all of which reported positive results on patient satisfaction with care and had a moderate risk of bias (Table 4).

A qualitative study of specialist outreach nurse visits for patients with stroke and their caregivers was conducted in England to complement the RCT by Forster and Young (1996) (Dowswell et al., 1997). Although the quantitative results showed no significant improvements, the interviews revealed that most patients and caregivers perceived that they had benefited from the intervention, valuing both the professional knowledge of the nurses as well as less tangible aspects such as their empathy and concern. Participants reported that an individualised and flexible service had been provided, in which nurses were able to respond to their needs in a timely and skilful manner.

Another qualitative study in England compared the experiences of patients receiving hospital-based and home-based cardiac rehabilitation (Jones et al., 2007). The hospital patients reported gaining motivation and support from other patients as they participated in group exercises and interacted with each other. On the other hand, the home patients valued the information, advice and one-to-one support of nurse-facilitators that they received. A perceived advantage of home over hospital rehabilitation was that patients felt more in control of their own rehabilitation and it felt more like a lifestyle change than a treatment.

A cross-sectional survey in Netherlands explored patients' and nurses' perspectives of two nurse-led disease management programmes (DMPs) differing in intensity (Hoekstra et al., 2010). Participants of both DMPs reported satisfaction with the care received. However, nurses reported that treatment and educational goals were more often achieved for patients with severe heart failure in the intensive support group than the basic support group (85% vs. 70%). Nurses and patients of the intensive support group

also perceived that home visits were beneficial to heart failure care, especially for patients who have difficulties accessing outpatient clinics.

Table 4: Characteristics, findings and risk of bias of studies on quality of care outcomes

Author and Year	Study Design	Population and Context	Intervention/Control	Outcomes and Findings	Risk of Bias Assessment
Dowswell et al., 1997	Qualitative	30 patients with stroke and 15 caregivers in England	The intervention consisted of home visits by specialist outreach nurses over 12 months. Content of the visits included goal-setting, problem-solving and tailored information, advice and support. The nurses also maintained telephone contact with the patients and caregivers. The nurses were experienced with disabled elderly patients and in community-based problem-solving approaches. They also attended a pre-intervention training programme to improve their counselling and listening skills.	Participants perceived that they had benefited from the intervention, valuing both the professional knowledge of the nurses as well as less tangible aspects such as their empathy and concern. Patients and caregivers both reported that an individualised and flexible service had been provided, in which the nurses were able to identify and respond to their needs in a timely and skilful manner.	Moderate (reliability of data analysis, generalisability and ethics not addressed)
Hoekstra et al., 2010	Cross-sectional	442 patients with heart failure and 32 registered nurses in Netherlands	The intensive disease management programme included patient education and counselling, telephone calls with heart failure nurses during the first month, 2 home visits by heart failure nurses, monthly clinic visits to the heart failure nurse for 18 months and multidisciplinary advice. The basic disease management programme included fewer clinic visits, only 1 telephone call by a heart failure nurse, no home visits and no multidisciplinary advice. All participating nurses received training prior to the interventions.	Participants of both DMPs reported satisfaction with the care received. However, nurses reported that treatment and educational goals were more often achieved for patients with severe heart failure in the intensive support group than the basic support group (85% vs. 70%). Nurses and patients of the intensive support group also perceived that home visits were beneficial to heart failure care, especially for patients who have difficulties accessing outpatient clinics.	Moderate (high selection bias and moderate attrition rate)
Jones et al., 2007	Qualitative	26 patients with heart disease who had completed a cardiac rehabilitation programme in England	Participants of the home cardiac rehabilitation programme were provided the Heart Manual (a 6-week programme of exercises accompanied by information and relaxation tapes) and received home visits as well as telephone calls from nurses for 12 weeks. The hospital cardiac rehabilitation programme was based on circuit training.	The hospital patients reported gaining motivation and support from other patients as they participated in group exercises and interacted with each other. On the other hand, the home patients valued the information, advice and one-to-one support of nurse-facilitators that they received. A perceived advantage of home over hospital rehabilitation was that patients felt more in control of their own rehabilitation and it felt more like a lifestyle change than a treatment.	Moderate (reflexivity, generalisability and ethics not addressed)

3.2.5.Multiple outcomes

Six studies assessed multiple outcomes of community-based nursing interventions for patients with CVD, four of which had a moderate risk of bias and two of which had a low risk of bias (Table 5).

Two studies assessed health and healthcare utilisation outcomes. A Spanish RCT was used to examine the effectiveness of a home-based educational intervention delivered by nurses for patients with heart failure (Aguado et al., 2010). At 2-years follow up, the intervention group had significantly fewer unplanned readmissions (mean 0.68 vs. 1.71, p=0.000), fewer emergency department visits (mean 0.68 vs. 2.00, p=0.000), and lower healthcare costs (€671.56 vs. €2,154.24 per person, p=0.001). There was also a trend towards reduced mortality (46.6% vs. 55.3%, p=0.448) and improved quality of life. A non-randomised controlled study was also conducted in US to pilot test a nurse-directed home care intervention for elderly with heart failure (Delaney and Apostolidis, 2010). Significant improvements in quality of life (42.5±17.9 – 52.7±18.7, p=0.007) were reported in the intervention group. Intervention participants also showed greater improvements in symptoms of depression (mean difference 3.0 vs. 1.1, p=0.001) and lower hospital readmission rates (16.6% vs. 25%, p=0.740) than control participants.

Two studies assessed health and quality of care outcomes. A non-randomised controlled study in Thailand evaluated a nurse-led community care programme promoting coordination and continuity of care for patients with chronic obstructive pulmonary disease, coronary heart disease and chronic heart failure (Sindhu et al., 2010). For patients in the intervention group, severity of disease was found to be significantly lower at weeks 3 and 8 (2.41±0.87 – 2.95±0.83, p=0.035; 2.30±1.82 – 2.95±0.83, p=0.041) and satisfaction with care was reported to be significantly higher (86.45±8.93 vs. 73.13±17.06, p=0.000) than the control group. A pre-post intervention study in Australia investigated the effects of a home-based cardiac rehabilitation programme delivered by community nurses with cardiac training on health outcomes and rehabilitation accessibility (Warrington et al., 2003). Significant improvements were found in patients' quality of life, knowledge of angina and exercise levels. Furthermore, 51% of the patients who participated in and completed the rehabilitation programme were older women, who often fail to access

hospital-based rehabilitation, suggesting that such interventions could improve the accessibility of rehabilitation for cardiac patients.

One study assessed health and self-care outcomes. An RCT in the US evaluated the impact of an education-support intervention delivered by advanced practice registered nurses for patients with heart failure (Clark et al., 2015). Intervention participants achieved significantly higher scores on functional status (62.61±21.80 vs. 60.43±24.12, p=0.035), self-efficacy (93.00±11.46 vs. 86.50±16.50, p=0.028), quality of life (69.79±23.67 vs. 55.67±31.71, p=0.018), metamemory, heart failure knowledge, self-care ability and a non-significant improvement in depressive symptoms.

Another study assessed healthcare utilisation and self-care outcomes. A pre-post intervention study evaluated the impact of a self-care intervention for elderly patients with heart failure receiving home visits by nurse practitioners in the US (Bryant and Gaspar, 2014). The patients demonstrated a significant increase in all three aspects of self-care: maintenance (mean difference 18.6 [95% CI 11.7 – 25.5], p<0.001), management (mean difference 35.0 [95% CI 15.4 – 25.5], p<0.01) and confidence (mean difference 33.1 [95% CI 23.0 – 43.1], p<0.001) Furthermore, no participants were hospitalised for heart failure during the six months after the intervention.

Table 5: Characteristics, findings and risk of bias of studies on multiple outcomes

Author and Year	Study Design	Population and Context	Intervention/Control	Outcomes and Findings	Risk of Bias Assessment
Aguado et al., 2010	Randomised controlled trial	106 patients in Spain with advanced heart failure, a high percentage of which were of high social and education level	The intervention consisted of a home visit by a trained nurse who assessed patients' knowledge and habits and then educated patients and caregivers on the disease, self-management, habits and preventive activities.	At 2-years follow up, the intervention group had significantly fewer unplanned readmissions (mean 0.68 vs. 1.71, p=0.000), fewer emergency department visits (mean 0.68 vs. 2.00, p=0.000), and lower healthcare costs (€671.56 vs. €2,154.24 per person, p=0.001) than the control group. There was also a trend towards reduced mortality (46.6% vs. 55.3%, p=0.448) and improved quality of life.	Moderate (no blinding and high attrition rate)
Bryant and Gaspar, 2014	Single group pre-post intervention study	18 heart failure patients aged 65 and older in an urban area of the United States	The Heart Failure Self-care to Success (HF S2S) intervention included a combination of patient education (e.g. on sodium intake, fluid balance, diet and activity), management (e.g. monitoring of medications, weights, and edema) and one-on-one counselling with nurse practitioners via home visits over a 6-month period.	A significant increase was found in all three aspects of self-care: maintenance (mean difference 18.6 [95% CI 11.7 – 25.5], p<0.001), management (mean difference 35.0 [95% CI 15.4 – 25.5], p<0.01) and confidence (mean difference 33.1 [95% CI 23.0 – 43.1], p<0.001). No participants were hospitalised for heart failure during the 6 months after the intervention.	Moderate (high selection bias and no adjustment for confounders)
Clark et al., 2015	Randomised controlled trial	50 well-educated heart failure patients in an urban area of the United States	The intervention group received 3 months of education-support home visits followed by 3 months of telephone and/or e-mail support from advanced practice registered nurses with expertise in heart failure and cardiovascular nursing. The intervention sought to build participants' self-efficacy using strategies such as social persuasion and encouragement, focused feedback, breaking information down into realistic segments and skills mastery. Memory enhancing strategies were also incorporated into the intervention. Patients' spouses were encouraged to participate.	Intervention participants achieved significantly higher scores on functional status (62.61±21.80 vs. 60.43±24.12, p=0.035), self-efficacy (93.00±11.46 vs. 86.50±16.50, p=0.028), quality of life (69.79±23.67 vs. 55.67±31.71, p=0.018), metamemory, heart failure knowledge, and self-care ability. Both intervention and control participants improved in depressive symptoms with no significant difference between the groups.	Low
Delaney and Apostolidis, 2010	Non-randomised controlled study	24 heart failure patients in the United States	The intervention consisted of 8 structured education visits by nurses with experience in cardiac care to teach heart failure self-management and prevent or reduce depression, as well as a tele-monitoring	Significant improvements in quality of life (42.5±17.9 – 52.7±18.7, p=0.007) were reported in the intervention group. Intervention participants also showed greater improvements in symptoms of	Moderate (high classification bias and no adjustment for

			system. The control group received usual care and tele-monitoring.	depression (mean difference 3.0 vs. 1.1, p=0.001) and lower hospital readmission rates (16.6% vs. 25%, p=0.740) than control participants.	confounders)
Sindhu et al., 2010	Non-randomised controlled study	91 patients with coronary heart disease, chronic heart failure or chronic obstructive pulmonary disease in Thailand	A culturally-tailored disease management intervention was delivered by specially trained community nurses. Key elements of the intervention included: (1) disseminating evidence-based treatment recommendations through care pathways; (2) promoting a nurse-led model of care and skill-sharing across disciplines; (3) facilitating communication and development of skills in community workers; and (4) empowering patients and families to engage in self-care. The control group received usual care.	Intervention participants had significantly lower scores on severity of disease in week 3 (2.41±0.87 – 2.95±0.83, p=0.035) and week 8 (2.30±1.82 – 2.95±0.83, p=0.041) than control participants. Intervention participants also expressed higher satisfaction with care than control participants (86.45±8.93 vs. 73.13±17.06, p=0.000).	Low
Warrington et al., 2003	Single group pre-post intervention study	40 patients with heart disease in Australia, targeting those who seldom accessed rehabilitation such as elderly house-bound patients and those with transport problems	The intervention consisted of two home visits and two follow-up phone calls over a 9-week period by community nurses with additional cardiac training. Content of the visits included a nursing assessment (of patients' knowledge, motivation, health habits and social support) and educational information (e.g. on diet, medications and exercise). The phone calls were designed to provide encouragement, discussion, support and feedback.	Significant improvements were found in patients' quality of life, knowledge of angina and exercise levels. Furthermore, 51% of the patients who participated in and completed the rehabilitation programme were older women, who often fail to access hospital-based rehabilitation, suggesting that such interventions could improve the accessibility of rehabilitation for cardiac patients.	Moderate (high attrition rate and no adjustment for confounders)

3.3. Facilitators and Barriers to Intervention Success

Facilitators and barriers to the effectiveness of community-based nursing interventions were sparsely reported in the literature. Facilitators included the use of an individualised approach (Chang et al., 2016; Kidd et al., 2015; Rodríguez-Gázquez et al., 2012; Scott et al., 2004), multidisciplinary approach (Aguado et al., 2012; Coburn et al., 2012; Moore, 2016; Ray and Nair, 1991; Rondinini et al., 2008; Sindhu et al., 2010), specially trained nurses (Clark et al., 2015; Warrington et al., 2003), family involvement and support (Chang et al., 2016; Jones et al., 2007; Ray and Nair, 1991; Rodríguez-Gázquez et al., 2012), and the home setting (Aguado et al., 2012; Bertuzzi et al., 2012; Hoekstra et al., 2012; Jones et al., 2007; Warrington et al., 2003). Conversely, barriers to intervention success included the shortage of trained or experienced nurses (Moore, 2016; Coburn et al., 2012), nurses' lack of ability or confidence (Kidd et al., 2015), nurses' demanding schedules and limited time (Kidd et al., 2015; Moore, 2016), ineffective interdisciplinary communication/coordination (Forster and Young, 1996; Moore, 2016), and insufficient intervention intensity (Forster and Young 1996; Hoekstra et al., 2010).

4. Discussion

This systematic review sought to examine the role of community-based nursing interventions in improving outcomes for community-dwelling individuals with CVD. Of the twenty-five quantitative studies reviewed, thirteen reported statistically significant improvements in all their primary outcomes, seven reported a mix of significant and non-significant improvements, and five reported non-significant improvements. The results of the three qualitative studies were also largely positive. Positive outcomes were reported in the domains of self-care (n=10), health (n=8), healthcare utilisation (n=7) and quality of care (n=5). However, these results must be interpreted with caution given the variation in quality of the studies conducted. Only five of the twenty-five quantitative studies were assessed as having a low risk of bias. Four of these high quality studies evinced significant improvements in patients' knowledge and ability to self-manage, severity of disease, functional status, quality of life, risk of death, hospital readmission days, emergency department visits, healthcare costs and satisfaction with care. However, the fifth study (Forster and

Young, 1996) found no significant improvements in health or social outcomes, and a possible reason for this is explored below. The other twenty quantitative studies, which received either a moderate or high risk of bias assessment, provided inadequate information on the study methodology or suffered from methodological flaws such as high selection bias, high attrition rate, lack of blinding and lack of adjustment for confounders. Of the three qualitative studies, one had low risk of bias and two had moderate risk of bias. The latter two studies failed to address issues such as the reliability of data analysis, generalisability and reflexivity.

As the evidence did not present any clear causal relationships between the various types of interventions and their outcomes, it is not possible to draw any conclusions regarding the relative effectiveness of intervention components including the distinct approaches, strategies, delivery modes and dosages implemented in different interventions. However, some facilitators and barriers to intervention effectiveness did emerge from the data upon closer analysis.

Firstly, a tailored approach was identified as a major contributing factor to intervention success. For example, in Chang et al. (2016), the use of comprehensive assessments to identify patients' educational needs and develop individualised educational sessions was associated with improvements in sleep hygiene among elderly patients with lower educational levels. Similarly, in Rodríguez-Gázquez et al. (2012), providing information tailored to patients' characteristics was linked to the improvement of self-care behaviours in patients with low educational levels. This is in line with other literature that suggests tailored nursing interventions, especially educational or counselling interventions, could be more effective than standardised interventions as customised information is more likely to be read, understood, remembered and regarded as personally relevant (Ryan and Lauver, 2002; Suhonen et al., 2008).

As part of an individualised approach, the strategy of mutual goal-setting was also highlighted as a valuable intervention component. Mutual goal-setting is the process by which nurses and patients collaborate to define and achieve patient-identified goals, underpinned by the theory that active participation in and control over decision-making will facilitate patients' goal attainment (King, 1981;

Maves, 1992). In Kidd et al. (2015), qualitative evidence revealed that patients' identification of personally meaningful self-management goals through motivational interviewing, as well as the recording and monitoring of these in a systematic manner, helped to motivate patients and allowed nurses to provided tailored support that improved patients' self-management. In Scott et al. (2004), patients with heart failure who participated in a mutual goal-setting intervention also experienced significant improvements in perceived mental health and quality of life, which the authors suggested could have been attributed to an increased sense of control and autonomy. However, in Kline (2007), patients participating in a mutual goal-setting intervention did not show significant improvements. This could have been due to a mismatch between the outcomes measured (heart failure self-care and knowledge) and the goals set by patients (which were not focused on heart failure but rather on more immediate physical, social and emotional needs). Furthermore, some nurses in Kidd et al. (2015) reported lack of confidence in or ability to tailor the provision of support towards patients' personal goals and needs, as well as difficulties fitting the intervention into their existing schedules and heavy workloads.

In congruence with other literature observing that successful chronic disease interventions typically involve a multidisciplinary team (Wagner, 2000), many studies in this review identified a multidisciplinary approach as crucial to intervention success. Although all the interventions were led or primarily delivered by nurses, many studies emphasised the need for these nurses to collaborate with a diverse range of other healthcare providers such as general practitioners, cardiologists, physiotherapists and occupational therapists and community healthcare workers. Studies reported that communication and coordination between healthcare providers facilitated early detection of symptoms and timely provision of appropriate care to prevent the worsening of conditions and unnecessary hospitalisation or emergency department visits (Coburn et al., 2012; Moore, 2016; Sindhu et al., 2010). Communication techniques included emailing, updating electronic databases and periodic team meetings to discuss patients' clinical status and care plans (Aguado et al., 2010; Moore, 2016; Rondinini et al., 2008). In some studies, nurses also received supervision and/or prior training from other healthcare professionals to equip them with the theoretical knowledge and practical skills required to lead/deliver the intervention (Aguado et al., 2010;

Ray & Nair, 1991; Rondinini et al., 2008). Conversely, barriers to intervention success included inaccurate or delayed interdisciplinary communication (Forster and Young, 1996; Moore, 2016).

Additionally, the home setting was identified as a facilitator in several studies, particularly in facilitating patients' access and adherence to treatment. In Jones et al. (2007), several participants expressed that they would experience difficulties attending a hospital-based rehabilitation programme due to transport and caregiver needs but they were able to complete rehabilitation because of the home-based nursing intervention. Similarly, in Hoekstra (2010), patients and nurses identified home visits as a valuable component of the intervention giving insight into patients' home situations and adherence to the treatment, and were especially important for patients who could not visit outpatient clinics due to mobility problems. However, nurses in the study also acknowledged that home visits were time-consuming and not meaningful for patients who were without mobility or adherence problems.

Other important elements of interventions included the use of specially trained nurses and family involvement. Several studies highlighted the contribution of family members to intervention effectiveness by helping patients to understand information or supporting them in practising self-care behaviours at home (Chang et al., 2016; Jones et al, 2007; Ray and Nair, 1998; Rodríguez-Gázquez et al., 2012). Indeed, the positive effects of involving patients' family members in interventions and the important role that family members play in promoting patients' self-management is widely reported in chronic disease research (Deek et al., 2016; Hartman et al., 2010; Martire, et al., 2004; Whitehead et al., 2017). A systematic review on multidisciplinary heart failure interventions also identified the use of nurses specially trained in heart failure care as a crucial element to intervention success (McAlister et al., 2004). Many of the studies in our review utilised specialist cardiac nurses or generalist nurses who received additional cardiac training, and suggested that the shortage of suitable nurses and their limited time would be a challenge to the sustained effectiveness of these interventions (Coburn et al., 2012; Moore, 2016).

Another potential barrier to intervention success was insufficient intervention intensity, including intervention duration, frequency and content. In Forster and Young (1996), the cessation of regular home

visits after the first six months of the intervention was offered as a possible explanation of the lack of significant improvement in health and social outcomes for patients with stroke, with the exception of a subgroup of mildly disabled patients. This corresponds with the study by Hoekstra et al. (2010), which found that treatment and educational goals were less frequently achieved for patients with severe heart failure who received less intensive nurse support (reduced telephone contact, fewer clinic visits and no home visits), although no such difference was noted for patients with mild heart failure. These findings also align with the guidelines of the European Society of Cardiology, which recommends more intensive disease management programmes for patients with more severe heart failure (Dickstein et al., 2008).

5. Implications for Research and Policy

Given the above, it is clear that more robust research is required to draw more definitive linkages between different types of community-based nursing interventions and their outcomes. As most of the community-based nursing interventions are complex interventions that contain multiple interacting components, evaluation of these interventions according to the Medical Research Council (MRC) guidelines for complex interventions would be recommended. The MRC has called for more detailed reporting of intervention descriptions as well as process evaluations that scrutinise intervention implementation, contextual factors that influence outcomes, and causal relationships between intervention components and outcomes (Craig et al., 2013; MRC, 2018). Corry et al. (2013) have also produced a model for developing complex nursing interventions that complements the MRC framework with additional, nursing-specific guidance to aid the application of general research guidelines to the nursing discipline.

This review has suggested that the optimal intervention strategy, delivery mode and intensity may vary based on patient characteristics such as disease severity and ability to access institution-based care, which could be an area for further research. In light of concerns raised by nurses regarding limited manpower and time, more attention should also be paid to evaluating the long-term cost-effectiveness of these interventions and finding sustainable solutions. One example was found in the study by Warrington

et al. (2003), which specifically targeted patients with CVD who seldom accessed rehabilitation such as elderly housebound patients and patients with other chronic illnesses or transportation problems. High levels of participation and completion of the programme by older women was reported, which is a population group typically difficult to recruit and retain. While a detailed cost-effective analysis was not conducted, a surface estimate suggested that the use of generalist community nurses with additional cardiac training to deliver both routine nursing care and cardiac care within the same home visits may be a cost-effective approach. More studies that evaluate community-based nursing interventions within the real world setting of nurses' routine practice will aid further evidence-based development of policy and interventions.

Finally, most of the studies in this review were conducted in high-income countries. Given that LMICs bear the greatest burden of CVD, greater efforts should be channelled into testing and refining community-based nursing interventions in these countries in the context of different socioeconomic conditions and healthcare systems. Policy initiatives should also tackle the identified barriers that inhibit the effectiveness of these interventions. It is imperative to provide nurses with the appropriate education, training and support required for them to fulfil their roles as leaders and providers of CVD care in community settings. For example, continuous professional development programmes can offer nurses the opportunity to acquire additional skills in cardiovascular care, collaborating with patients, families and other service providers, as well as tailoring care towards individuals' characteristics, needs and goals. Inter-professional education should also be integrated into nursing education curricula to enhance competencies in communication and coordination and foster productive partnerships between health professions to achieve better outcomes (WHO, 2017b).

6. Strengths and Limitations

A strength of this review was the use of a comprehensive search string in a wide range of databases, including smaller regional databases, to increase the likelihood of capturing relevant studies from LMICs. There were also no language or date restrictions applied to our review. Furthermore, although the explicit

reporting of facilitators and barriers in the literature was sparse, an in-depth analysis of the studies was conducted to elicit some facilitators and barriers to intervention effectiveness that could aid the development of successful interventions and policies in the future. However, a limitation of this review was that a meta-analysis could not be conducted due to the heterogeneity across study designs, intervention types, population groups and outcomes measures. The change in understanding of CVD and clinical practice over the years may also have implications for the generalisability of our findings, which include some studies conducted over 20 years ago. Furthermore, there is a risk of publication bias as studies with null findings may be under-published, and the exclusion of grey literature in this review may have led to an over-representation of studies with positive results (Conn et al., 2003; McAuley et al., 2000). The risk of reporting bias within individual studies also cannot be ruled out as they may have neglected to report any negative or non-significant effects. Finally, there is a possibility of geographical bias as most of the studies in this review were conducted in Europe and North America.

7. Conclusion

This review has shown that community-based nursing interventions can improve outcomes for patients with CVD in the domains of self-care, health, healthcare utilisation and quality of care. These outcomes include patients' knowledge and ability to self-manage, severity of disease, functional status, quality of life, risk of death, hospital readmission days, emergency department visits, healthcare costs and satisfaction with care. We have also identified several facilitators and barriers to intervention effectiveness that should be considered in the future development and implementation of such interventions. However, more rigorous research is warranted to provide conclusive evidence on which patients benefit most from which types of interventions and in what contexts. Further evaluation of the cost-effectiveness and sustainability of these interventions in real-world settings will also help to facilitate evidence-based policy-making. While it is clear that nurses have the potential to lead and deliver effective healthcare services for patients with CVD in the community, multiple gaps and challenges will need to be addressed to harness this potential and achieve optimal outcomes.

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